



Project - CS Ethics

Official Term Project Directive:

- Select and explore a topic relevant to Ethical CS (to be approved by the instructor).
- Create a presentation giving an overview of the issue, why it should be addressed, and possible solutions.
- The presentation should include program-based examples illustrating the problem and where appropriate to address solutions.

Depending on topic, each team may de/emphasize different portions.

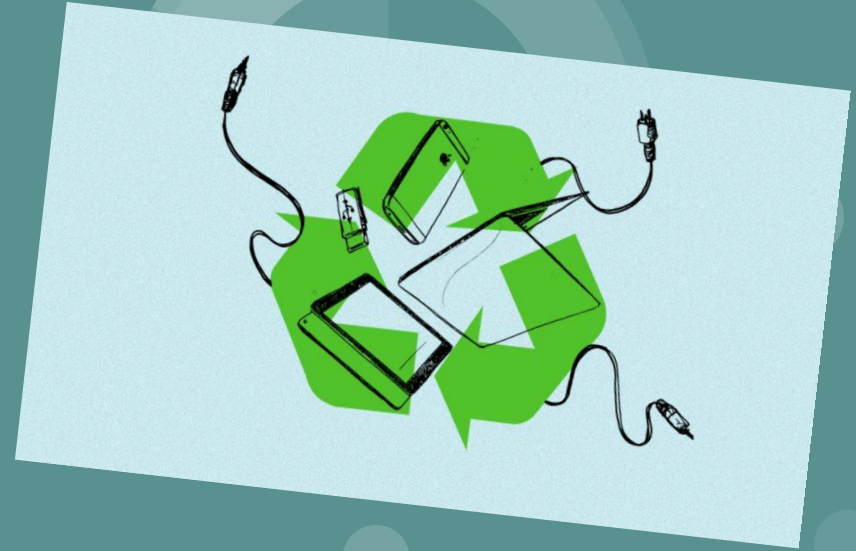
GUIDING GOAL: Leave your classmates with something they can incorporate into their own praxis. This could be a turn-key day/unit plan, code snippets or full working programs, or something more abstract. You know your audience...

DELIVERABLES:

- PDF of presentation (I.e., If you make a slide deck, export it to a PDF version.)
- optional: slide deck or other content in its original format (slide deck, document, etc)
- Any code you use or cite.
- Location/format: <reporoot>/99-eot/*

The IMPACT of The **Planned** **Obsolescence** of Smartphones on the Environment

Hunter CS Ethics
Sam Keener & Jack McCoy





The Problem:

The problem is that building a new smartphone—and specifically, mining the rare materials inside them—represents 85% to 95% of the device's total CO2 emissions for two years. That means buying one new phone takes as much energy as recharging and operating a smartphone for an entire decade.

The turnover of smartphones is a corporate strategy that tech companies will both encourage openly through marketing campaigns and encourage through subterfuge in their software.

Recycling E-Waste is much more complex and impacts the environment and humans around the globe in far more drastic ways than are presented.



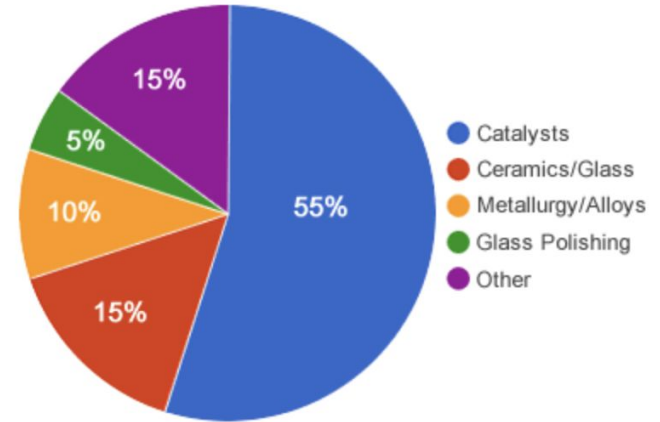
The Human & Environmental Costs are Monumental



The rare-earth mineral mine in Mountain Pass, Calif., run by Molycorp.

Jay Greene/CNET

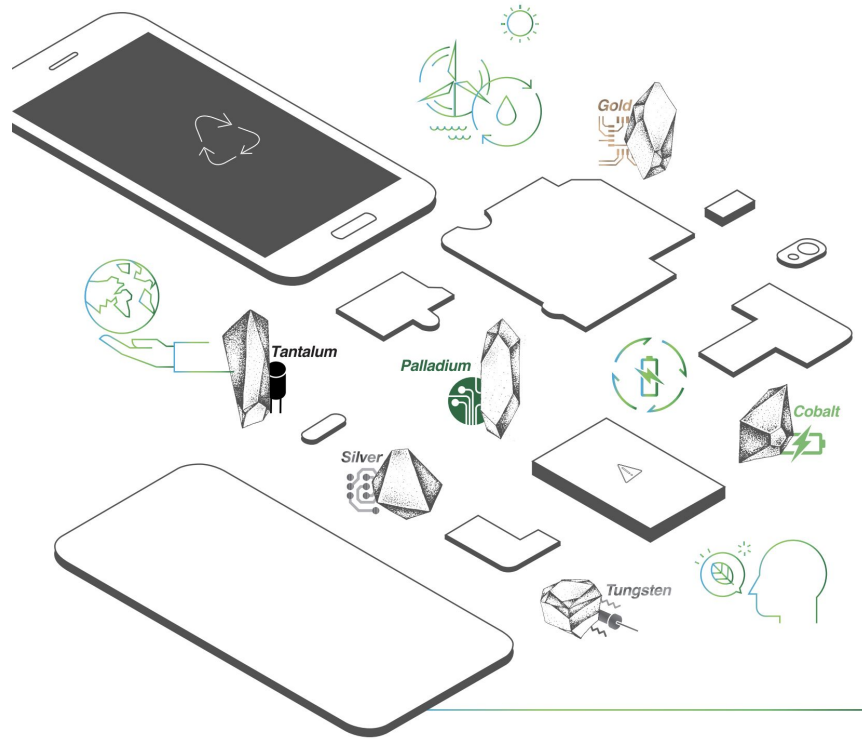
Uses of Rare Earth Elements



Uses in the United States as reported by the United States Geological Survey Mineral Commodity Summary, 2017

Uses of rare earth elements: This chart shows the use of rare earth elements in the United States during 2017. Many vehicles use rare earth catalysts in their exhaust systems for air pollution control. A large number of alloys are made more durable by the addition of rare earth metals. [Glass](#), [granite](#), [marble](#), and [gemstones](#) are often polished with [cerium oxide](#) powder. Many motors and generators contain magnets made with rare earth elements. Phosphors used in digital displays, monitors, and televisions are created with rare earth oxides. Most computer, cell phone, and electric vehicle batteries are made with rare earth metals.

Smart Device Composition - Rare Earth Elements



The dystopian lake filled by the world's tech lust



Baotou, Mongolia - Baogang Steel and Rare Earth complex

"In 2009 China produced 95% of the world's supply of these elements, and it's estimated that the Bayan Obo mines just north of Baotou contain 70% of the world's reserves." [Maughan 4/2015]

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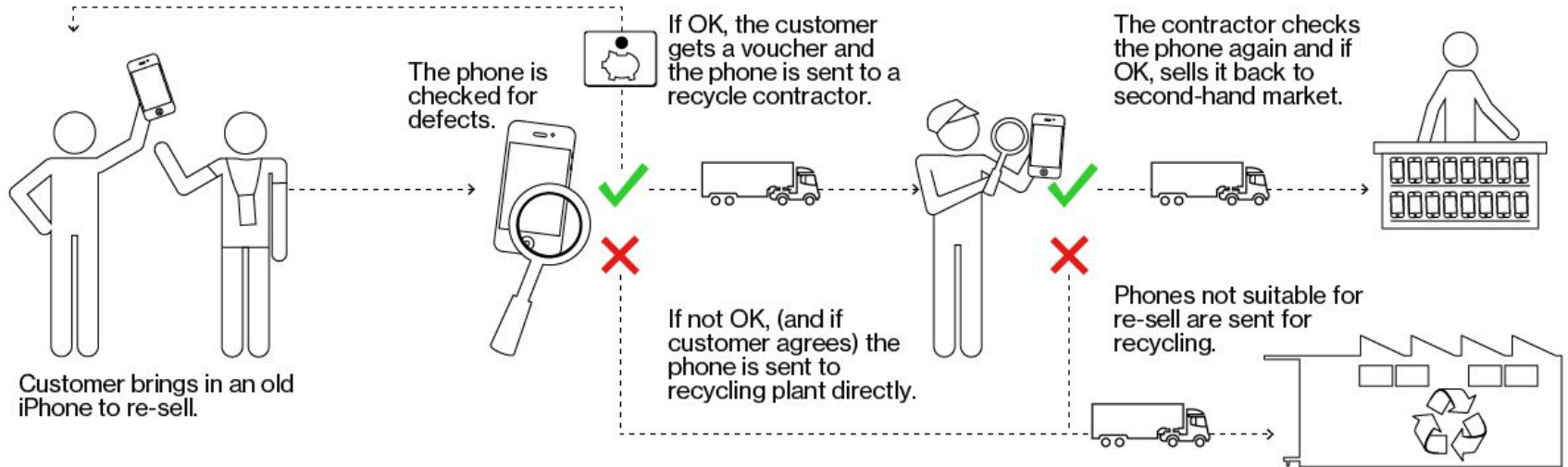




Recycling Chain for E-waste

Breaking Down the iPhone

Re-sell or Recycle?



The myth of E-waste Recycling

“If the electronics are past the point of no return, they’re sent to recycling plants and put through powerful, all-purpose shredders. Metal components are then shipped to one of a handful of registered smelters, where they’re melted down. A few precious metals from the circuit boards, including gold and palladium, are recovered from the molten liquid, but the vast majority of materials are left to burn, releasing chloride, mercury and other vapors into the atmosphere.” - This has a massive environmental and even larger human impact

“Only when it’s cheaper for companies to reuse component parts — rather than manufacturing from scratch — will our old phones truly meet a better fate.”





Mobile Phone Recycling Data as of 2016

- 61% of the world's population now own a mobile phone.
- The number of mobile devices on the planet is growing 5 times faster than the number of people.
- A consumer will keep their phone on average for 15 months before upgrading.
- The average mobile device has a usable lifespan of 7 years.
- Only 12% of mobile phones are recycled.
- In 2016, 65,000 metric tonnes of mobile phones were discarded – that's 8.9 Eiffel Towers stacked into a heap.
- 350,000 mobile phones were dumped every day in 2010. That's over 150 million phones a year.
- It takes 515 recycled mobile phones to power a home for a year.
- 80% of the parts in a phone are recyclable.



Apple is one of the greenest big tech companies, but do they do enough?



Is Apple Green? (+)



- Considered Green among Tech companies - landed at number 1 on the top 5 greenest Tech companies list in 2019
- Apple powers their data centers with 100% renewable energy, and has pressured suppliers to do the same doubling the number of suppliers to 44 in 2019.
- All *final Assembly* sites are now certified as zero waste to landfill (Apple claims this conserves billions of gallons of water and reduces greenhouse gas emissions)
- In 2019, Apple also worked with/pressured suppliers to reduce greenhouse gas emissions by 466,000 annualized metric tons [equivalent to taking 100,000 cars off the road for one year]
- Apple has said publicly that it wants to stop mining the earth altogether and is working on developing synthetic versions of rare metals, part of its plan to make electronics using only recycled or renewable materials.



Is Apple Green? (-)

- Apple promotes the turnover of iPhones both deliberately through sleek marketing, and in some cases via nefarious methods and alterations to their operating systems:
 - “In 2018, for instance, [Apple and Samsung were fined €10m and €5m](#) respectively for “dishonest commercial practices”, including the release of software updates to their smartphone products designed to cause “serious malfunctions and significantly reduce performance, thus accelerating phones’ substitution”” [Kat George, 3/2019]
- “Li Tong, one of Apple’s contractors in Hong Kong, says that “Shredding components takes more energy than repurposing.” She works and advises her other customers on how to repurpose their discarded tech into new tech, but Apple chooses to discard and destroy all of their components. “Apple shreds its devices to avoid having fake Apple products appearing on the secondary market”, said Apple’s head of environmental affairs, Lisa Jackson.” [Greg Barbosa 2/2016]
- Apple Argues that it balances their environmental impact outside of the use of renewable energy sources in their finishing plants, by donations to reforestation campaigns, but greenpeace argues that this does not go nearly far enough.
- Apple has also come under scrutiny multiple times for alleged human rights abuses in their supply chain

There is some hope in an upstart company in Europe - FAIRPHONE

Best in the industry for greener electronics

B-Corporation certified



An important part of our social enterprise identity is the open collaboration with independent certification organizations. We're proud to be B-Corp certified, joining a community of over 1000 companies, using business to address social and environmental issues.

EcoVadis gold medal



The Fairphone philosophy is embedded in the way we run our company. This commitment to fairness has been made measurable by the globally-recognized EcoVadis sustainability rating. We're the only smartphone manufacturer with a gold medal, putting us in the top 1% of our industry.

iFixit 10/10 score



Our core value of longevity is designed directly into our smartphones. We created the Fairphone 3 to last – both in its original design and in making the repair as easy as possible. This made it the only smartphone in the world to be awarded a perfect iFixit score for repairability.

Fairtrade gold integrated



The materials that go into your phone have an impact on people and the planet. We want to go straight to the source to make sure we're creating positive change. Using responsibly sourced materials, we are the first and only smartphone company to be Fairtrade gold certified.





The Impact -

What can we as the consumer do?

- Reuse is the best form of recycling
- Upgrade only when necessary
- Buy Refurbished - We vote with our Money even in secondary markets - The Tech world is tough because there are so many large players, with relatively few options.
- In any case, keeping a smartphone for even three years instead of two can make a considerable impact to your own carbon footprint, simply because no one has to mine the rare materials for a phone you already own.

Compared to industry waste, these changes have relatively small impact - We must push for big Tech Regulation, Environmental Restrictions and policy change through education and voting.





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